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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,219	12/21/2001	Cyprian E. Uzoh	042496/0269264 NT-235	3469

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EXAMINER	
CHEN, KIN CHAN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,219	UZOH ET AL.	
	Examiner	Art Unit	
	Kin-Chan Chen	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer et al. (US 6,315,883; hereinafter "Mayer") in view of Shue et al. (US 6,083,835; hereinafter "Shue").

Mayer teaches a method for planarizing a non-planar conductive surface. A conducting material may be applied onto a top surface of the conductive surface layer using a method that does not involve electroplating so that a top surface of the conducting material layer is planar (**especially, see col. 9, lines 37-39; 44-45**), thus forming a planarized multi-layer structure that includes the non-planar conductive surface layer and the conducting material layer. The planarized multi-layer structure may be electropolished. At least portions of the non-planar top conductive layer may be removed along with portions of the conducting material layer (col.9-11; Figs. 4-7).

Mayer does not teach that the conducting material and the conductive surface layer may be electropolished at substantially the same rate. In a method of planarizing, Shue teaches that a layer of copper alloy may be deposited over the damascene wiring trench using any of several methods and then electropolished in order to prevent any

dishing effects (col. 3, lines 26-38). Hence, it would have been obvious to one with ordinary skilled in the art to modify Mayer by using a layer of copper alloy as taught by Shue in order to prevent any dishing effects. Furthermore, because the combined Mayer and Shue has the conducting material that is similar to the material of the conductive surface layer, the electropolishing of both layers at substantially the same rate would have been expected.

Mayer teaches that the material may be further removed to expose a barrier layer and a dielectric layer (col. 10, lines 11-20; Fig. 8). Furthermore, it is a notoriously well-known practice in the damascene and metallization process in the semiconductor device fabrication.

As to dependent claims 10-14, Shue is not particular about forms of the material (e.g., slurry, power, or emulsion) and method for applying the conducting material. Hence, it would have been obvious to one with ordinary skilled in the art to use commercial available form of material (e.g., slurry, power, or emulsion) and method in order to accommodate various dimensions, shapes and product requirements. Thus, claims 10-14 are rejected for the same reason, supra.

As to dependent claims 15 and 16, the combined prior art teaches using electropolishing. The combined prior art is not particular about the process. Hence, it would have been obvious to one with ordinary skilled in the art to use ECME or electrochemical etching process because it is one of the most popular methods of electropolishing.

The above-cited claims differ from the combined prior art by specifying well-known features (such as annealing process /diffusion process; removing layers using CMP, wet etching, or RIE) to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by adding any of same well-known features to same in order to provide their art recognized advantages and produce an expected result. It is noted that applicant did not traverse the aforementioned conventionality (e.g., well-known features, obviousness), which have been stated in the previous office action on August 20, 2003.

Response to Arguments

3. Applicant's arguments filed November 25, 2003 have been fully considered but they are not persuasive.

Applicant has argued that Mayer does not show applying a conducting material layer onto a top surface of the conductive surface layer forming a planarized multi-layer structure. In fact, as has been stated in the office action, Mayer teaches applying a conducting material layer onto a top surface of the conductive surface layer forming a planarized multi-layer structure (**especially, see col. 9, lines 37-39; 44-45)**.

Applicant has argued that the combined prior art does not teach annealing the conducting material layer. In response, as stated in the office action, annealing is a well-known process that has been used to eliminate stress and provide stable physical properties during the metallization process steps whenever needed.

Applicant has argued that the combined prior art does not teach removing the material to expose a barrier layer and to expose a dielectric layer. In reply, as stated in the office action, Mayer teaches that the material may be further removed to expose a barrier layer and a dielectric layer (col. 10, lines 11-20; Fig. 8). Furthermore, it is a notoriously well-known practice in the damascene and metallization process in the semiconductor device fabrication.

Conclusion

4. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-

1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-0988.

January 9, 2004

KIN-CHAN CHEN
PRIMARY EXAMINER